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ABSTRACT

This paper examines the scientific basis of teaching, the logic of science, the politics of teaching-as-a-science (TAS), and the application of teaching method. It argues that teachers have neither the time while in school nor the prerequisite training in scientific methodologies with which to study their own teaching scientifically, analyze the methods of science, and suggest methodological improvements. Because of the lack of opportunities for teacher research, much that they learn over the years of teaching is lost to later generations of teachers. Their experiences are not systematically recorded or used to expand, change, or improve the existing knowledge base. As the empirical research base in teaching expands, public school systems may be forced by the weight of such research to make room for more research-based changes in the schools. Educational research may represent a threat to the politics of non-scientific teaching. TAS is an alternative to traditional teaching in which science forces old schools into new educational methods. The paper examines three issues: (1) the role of politics in teaching; (2) objections to TAS (teaching is not a science, and there is no proof that the scientific method is valid); and (3) the politics of TAS (TAS-generated reform, some unanswered questions regarding TAS, teacher autonomy, classroom realities, economics of TAS-related reform, lay school boards, TAS and traditional schooling, piecemeal reform, and reforms inside traditional school structures). (SM)

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# THE POLITICS OF TEACHING AS A SCIENCE

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Paper presented at the American Educational Studies Association (AESA) annual convention, Chicago, Illinois, October 26, 1989.

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# THE POLITICS OF TEACHING AS A SCIENCE

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## INTRODUCTION

The paper is an inquiry into the scientific basis of teaching, the logic of science, the politics of teaching-as-a-science, and the application of teaching method. By "science" we mean the study of theory empirically, including the empirical verification of theoretical claims in education. Teachers rely heavily on their own experiences in teaching, or, less frequently, on the experiences of their colleagues. Nevertheless, theirs is more a limited or case-by-case approach to testing the "truth" of educational theories, than the systematic, controlled, or empirical study of teaching which is usually associated with a science of teaching, or, methodologically, with any science (Borg and Gall, 1983; Glaser, 1978; Lortie, 1969). Teachers in the public elementary or secondary schools have neither the time while in school, nor the prerequisite training in scientific methodologies with which to study their own teaching "scientifically," analyze the method of science itself, or suggest methodological improvements[1]. As a result of the lack of opportunities for research by teachers, or incentives for doing such research, much that teachers learn individually on their own as a result of years of teaching is usually lost to later generations of teachers. Their experiences with teaching are neither systematically recorded, nor used to expand, change, or improve an already existing knowledge base.

As the empirical research base in the area of teaching expands, our public school system may be forced by the weight of such research to make room for more research-based changes in the schools. In the meantime, educational research may represent a real threat to the politics of non-scientific teaching. As an alternative to traditional teaching, teaching-as-a-science, or TAS for short, is like an altogether different solar system in which the sun of science forces old school planets into new educational orbits.

## DEFINITIONS

### Definition of Teaching as a Science (TAS)

As mentioned earlier TAS is the idea that we could more

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[1]For example, teachers rarely set up hypotheses of what "works" while working as teachers, or test in teaching practice the "truth" of different educational theories.

effectively meet our teaching goals if teaching were based on scientific research findings, in the broader sense of the term "science" as the empirical study of theory. Thus by "scientific" we mean more an attitude toward the testing of ideas in experience, than a specific method of what "works" in education. Metaphysically speaking, TAS is a meta-method of teaching. Implied in TAS is the idea that teachers are free or professionally autonomous enough to select those methods which their own or other people's "research" may have shown works.

Assumptions Regarding Truth

Behind the scientific "testing" of theories in experience may be another one, namely, that such testing is necessary in the discovery of "truth." This may sound very obvious to many people today who are engaged in research, in fact so obvious that they may not consider worth mentioning. Yet the very fact that it sounds obvious may be proof of the hold which the surrounding culture sometimes may have on our minds, in this case, our culture of science or science-based assumptions regarding "truth." Such culture may shape not only our methods of discovering truth, but also our values regarding life, in general. Thus to scientists who do scientific work on a daily basis, or who have been trained for many years in scientific procedures, the experimental basis of truth may be so obvious that they rarely bother to question it, or to think in terms of non-experiential truth systems (Kuhn, 1962)

Definition of Politics

By "politics" we shall mean those human configurations, be they the majority of people in a democracy, or the military in a dictatorship, that determine which competing plan or theory will be allowed to actually shape the lives of the people within their own "polis." It follows that the "politics of teaching" includes not only configurations of professional educators within the educational community, but also those human configurations outside education, such as, lay school boards and courts of law, which in combination may actually exercise as much or more influence on educational policy than the professionals inside (Smith, 1990: 101-145).

Definition of Teaching

By "teaching" in this paper we shall mean teaching primarily in elementary and secondary schools in the United States, although readers familiar with other types of teaching may recognize in our analysis the same types of teaching practices at the college or adult levels. We may note here that more than a social science with theories of how to influence the learning behavior of students, teaching is also a profession in which what is learned in teacher training is presumably applied by teachers in actual learning environments.

## THE ROLE OF POLITICS IN TEACHING

The politics of TAS may be on a collision course with the politics of the traditional school (Cronin, 1978; Gagne, 1978; Greer, 1972; Wingo, 1974: 27-48). According to James Shaver, the teaching of social studies in the public schools "seems virtually undisturbed by research... remains bound to moralism and prior practice." (Nelson and Shaver, 1985: 420) Others think that public schools are too politicized to allow the "disinterested" application of educational research findings. As Lawrence Cremin, a historian, put it, "research cannot replace politics in education." (Cremin, 1965: viii) Educational innovations ranging from Head Start and mainstreaming, to Operation Follow Through, and, more recently in the city of Chicago, the local school councils movement, were first voted in and implemented system-wide, and only subsequently studied scientifically (Clifford, 1975; Hodgkinson, 1976; Katz, 1971). As it turned out, many of these programs were shown to be less effective, based on their learning outcomes, than the old programs which they replaced (Averch, 1972). A more careful review of the research before such programs were applied might have warned us of their possible shortcomings. For example, we found after-the-fact that mainstreaming as it was originally practiced caused about half of those who were mainstreamed to perform worse, academically, than before they were so mainstreamed (Linton and Juul, 1980; Semmel, Gottlieb, and Robinson, 1979). Even in those cases where research played a role in educational reform, as in the recent plan in Denver to phase out remedial classes, we are not sure whether it was used to buttress an already made political decision, or chosen over politics to help raise student academic achievement (Education Week, Oct. 11, 1989).

The irony here is that even if research were chosen over politics, the very fact that it was, is itself a political decision. This is so because every decision is at bottom political, since it presumes one value over another, and therefore the politics of one over the politics of the other. There is a world of difference between non-scientific and science-based politics, since the former uses science expediently, while the latter cannot possibly fulfill a political end without consistently consulting science. Nevertheless, the fact remains that choosing science over non-scientific politics involves choosing one over the other, and is therefore itself a political choice.

We submit that science is itself a value, and therefore has a politics and an educational agenda of its own. We may disagree with scientific values, and therefore may try to resist their implied political agenda. The success of science, or by extension of TAS, may depend as much on how the wider community or "polis" views scientific research (hence, on politics), as on how effective science is in solving problems. For example, it may be very

difficult to conduct scientific research in a community with anti-scientific values, as, for example, was the case during the Middle Ages (Barraclough, 1970).

## OBJECTIONS TO TAS

### Teaching is Not a Science

It may be argued that teaching is not a science, and therefore no amount of scientific research findings can help improve its effectiveness[2]. For example, according to several writers teaching is an art (Highet, 1950; Morganroths, 1982). By now, there are exhaustive reviews of experimental studies on teaching. These include such well known "reviews of reviews" as the third edition of the Handbook of Research on Teaching; or the second edition of Sarane S. Boocock's encyclopaedic textbook on research studies done in the area of sociology of education (Boocock, 1980; Wittrock, 1986). If the studies described in these sources are any indication of whether teaching can at least be studied scientifically, then either teaching is a science, meaning, possible to study under experimental conditions (as it was in the studies done so far); or else such research has been, all claims to the contrary notwithstanding, unscientific. So far several hundreds of studies seem to have found several predictable events regarding teaching inside traditionally structured schools, that is, inside most of our public elementary and secondary schools. Such findings include, among others, the significance of student social class in academic achievement, independence training at home and the internalization of academic success, and the role of teacher expectations in motivating students to learn, to name but three (Boocock, 1980: 40-48, 81, 154-160).

The question may be raised, will the growing number of research findings regarding teaching eventually force us to change our educational methods? Or will the politics of teaching practice as a non-science force research back into its politically "innocuous" academic cage? This question represents, in a nutshell, the political conflict between school as-has-been, and teaching-as-a-science.

### There is no proof that the Scientific method is Valid

What guarantee is there that science as a method of "verifying" truth is more "valid" than non-scientific research methods? (Hempel and Oppenheim, 1953; Popper, 1968) For example, why is such method (or family of methods) more "true" or "valid" than, say, the theological, metaphysical, or analytic? Could it be that even while testing a theory scientifically, social scientists

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[2]The author discusses this issue in a book that he is writing on "Teaching as a Science."

may be assuming another, untested one through the means they employ to test it, namely, the theory that the scientific method is "better" or more "truthful" than other research methods? If social scientists attempt to test the truth of the scientific method, then they can test it by using either the scientific method, or by some other means. If they use the scientific method to test the validity of... the scientific method, then they would be assuming what they need to prove--thus falling into a circular argument that proves nothing. If they use another method, say, the "aesthetic method," meaning, the method that says a theory is true if it is aesthetically appealing, then even if they can thus show that science is "true" or "valid," to be really true or valid they must also show that the method they used to test the scientific method (in our example, the "aesthetic method") is also valid[3]. We shall define this method of inquiry as a method that assumes that something is "true" if it is "beautiful." Obviously, there is no end to how many methods they must prove to be valid in order to show that the scientific method is valid, and therefore impossible to show that the scientific method is indeed valid. Ironically, then, while social scientists test theories scientifically, there is one theory they seem unable to so test--the theory that in order to discover the truth about other theories, we ought to test theories scientifically. They seem to have adopted an untested, because possibly untestable belief, that is, their belief in the validity or truth of the scientific method. Even if it were possible to show through another method that the scientific mehod is valid, that fact that they did so through another method makes that other method also valid, and therefore shows that the scientific method is not the only method that is valid. Consequently, the individual is again faced with a choice between two equally "valid" methods, a scientific and a non-scientific one. If that is the case, then there is no reason why an educator, or anyone else for that matter, should use only the scientific method to test the validity of a learning theory.

## Conclusion

In response to the objection regarding the "validity" of the scientific method, we may conclude that there is nothing inherently superior about the scientific method which could be used to justify choosing it over other methods. We submit that if in our society as a whole we have crowned this method king, it might be more because in our culture we have come to value science over other systems of truth, such as, intuition or faith, than because it can be logically shown that it is "better." Education researchers may have come to adopt the scientific method in their research techniques because, like other researchers or institutions around them, they may have also come to share in its underlying message.

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[3]We use the "aesthetic method" only for illustration purposes here.

## Social Values and Teaching as a Science

The scientific method may represent two important values in our culture: our belief in the primacy of reason, and our belief in the priority of democratic principle. Reason, because presumably the scientific method relies on reason, rather than on faith, intuition, or superstition. And democratic principle, because the scientific method presumably allows all people the same opportunity to realistically "test" through their senses the "truth" of certain claims made by their leaders, and therefore has a leveling or "democratic" effect on political authority (Dewey, 1916; 1929).

## THE POLITICS OF TEACHING AS A SCIENCE

### TAS-generated Reform

TAS requires that educational institutions are re-organized around educational research, instead of research being forced to fit existing educational institutions. This means that TAS has a political agenda of its own which by definition identifies with no single type of educational institution, let alone with the traditional public school, but with whatever findings research may show are "effective" in the accomplishment of educational goals. TAS requires a school system that is more like a chameleon, than a petrified fossil: as new findings are formulated, old educational arrangements change to accomodate the new findings. It is in this sense that to be applied, changed, or improved TAS requires a changeable educational landscape. It requires that educational institutions become flexible enough to absorb new research findings, diverse enough to allow a variety of applications, and horizontal enough to serve rather than stifle teacher-generated change.

### Some Unanswered Questions Regarding TAS

If our culture at large has a love affair with science, in the broad sense of the term "science" as empirically verified theory, then why has teaching in our public schools remained unscientific? Could it be that our society for some reason makes an exception for teaching, or is it that teaching can never be a science? Or could it be that even if teaching is a science, in the sense that it can be studied scientifically; and science itself is valued by our culture, public schools are ruled by school bureaucracies that are too insecure to allow TAS-generated reforms? (Katz, 1975; Greer, 1972) Is it possible to apply new research in public elementary and secondary schools even if such research were available? Or are the circumstances in public schools such as to make such transfer almost impossible? Alternatively, could it be that we simply never had as many scientific research findings regarding learning as we do now, and therefore lacked in the past either the structure or the knowledge base with which to justify changing teaching

practice? Finally, if teachers are not allowed to apply research, nor encouraged to conduct research themselves as part of their work assignments; or if what they learn in college has no proof that it works in teaching practice, then is teaching really a profession? We shall attempt to address these questions in the pages that follow.

Teacher Autonomy

Unlike most "pure" social scientists, who are normally under no pressure to create the conditions under which they study, teachers are forced by their work to at once serve and observe: serve as teachers, and observe their work from a distance. But unlike other professions with more autonomy than teachers, such as, the medical profession, the nature of teacher service is more determined by people outside the profession, such as, lay boards of education, than by what teachers learn or observe about teaching (Scribner and O'Shea, 1974). To speak metaphorically, some teachers or researchers may be writing their own educational script, but when it comes to actually teaching they are usually forced to play in someone else's.

Classroom Realities

Another reason why teaching is not based on science may be because the realities of the classroom are so different from the research findings as to make such findings virtually useless or inapplicable (Gage, 1985: 23-24; Nelson and Shaver, 1985; Tyler, 1978). This position implies that it is not the politics of our established educational institutions that keeps TAS out, but the recalcitrant nature of the research findings themselves. Yet by the same logic, the argument may be made that if research findings seem inapplicable, it may be not because of anything inherently inapplicable in them, but because of political resistance to their application. Thus it may be argued that the interest of the school status quo in holding on to old power relationships may so outweigh its commitment to the improvement of teaching practice that it chooses ineffective methods that guarantee it its privileges, over effective teaching methods that don't.

Economics of TAS-related Reform

Another reason why TAS is not applied may be because of the lack of sufficient funds that will support science-based changes in the schools (Odden, 1986). For example, the public may lack the finances for system-wide changes, or even for supporting the testing of learning theories in experimental learning situations. Some methods, however effective they may be shown to be in improving student academic achievement, may require such drastic administrative changes, including institutional re-adjustments or occupational re-training, as to require a tremendous amount of necessary funds. In response to this argument regarding cost, it

may be said that even "cost" is relative to the value being placed on TAS-related reform by the society as a whole. In other words, the higher the value society places on students learning on the basis of research findings regarding learning, the less "costly" the cost of reform may seem. In fact, our society may see the "cost" of such reform as worth the price, or even as an economic "bargain," given the presumed long-term effects on students of TAS. To paraphrase a popular saying, where there is a political will to change an institution, there is probably also a financial way to do it.

Lay School Boards

The public, represented by mostly lay-composed school boards, and the parents of students, represented by their PTA associations (and in Chicago, by the newly formed local school councils) may feel its authority over the public schools challenged by views of the teaching field as science-based, as contrasted to views of teaching as lay-opinion based and controlled (American School Board Journal, 1988). TAS implies that only or primarily those trained in the science of teaching, including properly diagnosing learning situations, or subsequently selecting from a variety of teaching methods those which have been experimentally shown to best help students learn, should have the final say on who should teach, or how teaching institutions should be organized. The non-professionals who presently compose the school boards may feel they can more easily justify their control over public schooling if it is not seen as a science, and therefore not as something which people trained in the science of teaching can improve or manage any better than they can. Under such view of schooling, which we may refer to as "teaching-as-lay-opinion," those in charge of schooling need not be well versed in either the substance (academic subject), nor the form of teaching (teaching method). Both of these (subject and method) require considerable training which the non-professionals who now compose school boards may not have.

Teaching as a Science and Traditional Schooling

TAS may result in the "discovery" of effective teaching methods, including possibly some which are non-empirical or "unscientific." Some of these may have been known, but may have been either overlooked, disliked, or mis-applied. Will the discovery, re-discovery, or re-affirmation of such methods lead necessarily to educational reform? It is one thing to "discover" an effective teaching method, and an altogether different matter to be able to apply it. As mentioned earlier, every teaching method is inextricably tied to a certain administrative or architectural arrangement. Consequently, applying a TAS-generated method may require changing not only classroom-limited teaching methods, that is, methods used inside a classroom, but the very structure of the classroom itself, if not the whole school. For example, while the lecture method may require that students learn in a room together

so they can hear and discuss their teachr's lecture, the project method may require that students have access to community resources, such as, libraries, museums, businesses, and other art and civic institutions. These changes in turn may require that many institutions in our society make space, time, or resources available to "visiting" students on a regular basis, while teachers re-learn how to teach in the community. If anything, our inability to apply TAS may be an indication not only of the difficulty of changing our institutions, but more fundamentally of the hold which certain of our freely chosen but strongly held values may have on our behavior.

Piecemeal Reform

The more radical the changes that must be made to apply TAS, the more likely it is that such changes will be resisted by those who feel threatened by such changes (Gage, 1985: 3). It may be argued that one way to get around such resistance may be to change the educational system in a piecemeal fashion so that the outlying administrative structure of public schooling remains essentially unchanged. The question may be raised, how much "surgery" can a new method withstand to make it fit inside existing structures without "suffocating" it in the process? The problem with such piecemeal approach may be that a new teaching method may be so different from existing structures that it can't possibly be applied in such fashion without also destroying it. By half-changing a method to make it "fit," we risk destroying its substance. To speak metaphorically, after several changes to its form or substance to make it fit inside an existing structure, a method may become a lifeless carcass of its older self. As a result, the method may fail to work as predicted, while the institution that originally resisted it may now claim that the method doesn't work, or that the institution was better off prior to reform. In fact, the method itself may have never "failed," because it may have never been applied as it was originally intended.

Reforms Inside Traditional School Structures

It may be argued that if educational research were to be limited inside only traditional educational structures, such as, the context of the traditional public school, then its results could be predictably applied to at least these structures. Yet the more research is limited to traditional structures, the less we may be able to evaluate their effectiveness. This is so because by limiting research to traditional structures, we have no way of evaluating the effectiveness of the traditional school structure vis-a-vis non-traditional structures. Our knowledge regarding the success of a teaching method within the context of a traditional structure may be overshadowed by our ignorance regarding its success in non-traditional settings. This may lead to our having the false impression that we are improving our schools, when in fact we may be improving them no more than a possibly "ineffective"

structure allows. This is particular alarming in light of the fact that so far only a relatively few research studies have been carried out in non-traditional settings (Walberg, and Thomas, 1972). Implied in TAS is the idea that what "works" in teaching couldn't possibly be limited inside traditional school structures without having first examined empirically what works in alternative structures, and then comparing them in order to discover what structure works "best." (Fantini, 1973) Anything short of that wouldn't allow us to conclude whether any method "works," but at best that it works only in the context of this or that educational structure or "situation." Finally, by leaving out alternative structures from our research efforts, we may come as a society to psychologically identify all educational research as research done within only traditional structures. As a result, the traditional structure may be seen by either the public or the researchers as so all-inclusive as to become mentally identified with all that is possible, and therefore as "unchallengeable."

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